NOTE I.

A MONOGRAPH OF THE AFRICAN SQUIRRELS, WITH AN ENUMERATION OF THE SPECIMENS IN THE LEYDEN MUSEUM

BY

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The African Squirrels have never been monographically studied, although a large number of more or less important descriptions of different species have been given, which are to be found in different periodicals. The late Temminck in his »Esquisses zoologiques sur la côte de Guiné. 1853" was the first to give a revision of the Squirrels from West-Africa known at that time. The late Gray in »the Annals and Magazine of Natural History, 1867" published a Synopsis of the African Squirrels and Huet described in his »Recherches sur les Écureuils Africains 1880" the Squirrels of the Paris Museum. These three publications are the principal sources. There are further several separate descriptions of species by Kerr, Ét. Geoffroy Saint-Hilaire, Desmarest, Smith, Fr. Cuvier, Rüppell, Wagner, v. Heuglin, Ogilby, Lesson, Waterhouse, Fraser, Peters, Le Conte, Du Chaillu, Gray, A. Milne Edwards, etc. More or less critical enumerations or compilations on this matter have been given by Fischer, Wagner, Schinz,

Fitzinger and Trouessart. These several authors have described no less than fifty Squirrels inhabiting Africa! This large number is *a priori* somewhat suspect and a careful study has indeed led me to the conclusion that of this number only nineteen species may stand.

The origin of the prodigious confusion which reigns in this group of Rodents is not far to seek and will be obvious by reading Temminck's *Esquisses zoologiques* and Gray's *Synopsis*. It seems that Temminck suffered from a sort of Anglophobia, fatal for science, but which may in some measure be attributed to his efforts to keep the Leyden Museum ahead of the British Museum. This led him into several mistakes and inaccurate considerations and was also the cause of a violent attack by Gray in the »Synopsis" just referred to; Gray accepted only two of Temminck's new species and accused him of having encumbered the list with *doubles emplois*, etc. It should be observed that Temminck had not seen the type-specimens in the British Museum and that he could not find or understand some of the original descriptions and that Gray on the other hand had not examined Temminck's types in the Leyden collection; he found them however described »in Temminck's usual general style". Nearly all the succeeding authors, adopting either Temminck's or Gray's opinion, have proved by their several mistakes that the African Squirrels require a complete and impartial revision, based upon an examination of the types.

Some time ago I had the advantage of visiting nearly all the Zoological Collections which contain type-specimens of these Squirrels and I undertook the task of studying these animals monographically, at the same time intending to give a catalogue of the specimens of this group in the Leyden Museum. We owe the large collection at present contained in this institution to the care of the late Temminck and of Prof. Schlegel.

I am very much obliged to the officers attached to the different Musea which I visited, but especially to Dr. Günther,

Prof. Peters, Dr. Steindachner and Prof. A. Milne Edwards for their great liberality which simplified my inquiries and for their kind informations. I may here be allowed to express my sincere and special thanks to all those gentlemen for their kindness.

The African Squirrels offer certain peculiarities which are not or rarely found in other Squirrels; they mostly present an olivaceous or greenish tinge, others a so-called desert-color: the fur, with a few exceptions, is not so soft and less dense than in other Squirrels, in some species the body is even covered with harsh and spiny hairs, a phenomenon not met with in Squirrels of other parts of the world. *Pari passu* with the harshness of the fur goes the straightness and the increased length of the claws. The ears are generally less developed and covered with very short hairs, which never form a tuft. Finally Africa has its own species of Squirrels, not a single species having hitherto been found in Asia which can be confounded with an African one.

Only a small number of skeletons of African Squirrels is preserved in the Museums and these skeletons moreover belong to only four species, viz:

	costales.	lumbares.	sacrales.	caudales.
Sciurus annulatus Desmarest (*multicolor* Rüppell) with .	12	7	5	25
Sciurus congicus Kuhl (*flavivittis* Peters) with . . .	12	7	3	29
Sciurus getulus C. Gessner .	12	7	3	22
Xerus erythopus É. Geoffr. St. H. (*leucoumbrinus* Rüppell)	12	7	4	25, 26 or 27.

A very great difference in the shape and size of the skull obtains in the different species. As it is here however not my intention to enter into osteological discussions, the reader will find sufficient materials concerning this matter in the measures of skulls which I give in the respective descriptions.

Of the nineteen species which I distinguish, there are ten which have four molars in each jaw and nine which

present a small fifth molar in each upper jaw. It is however an impossibility to bring them for this reason under two heads, as it often happens that of two closely allied species the one has $\frac{4}{4}$ and the other $\frac{5}{4}$ molars. The number of molars is a very constant and thus a good characteristic for distinguishing the several species. In adult specimens the first small upper molar does not fall out, as some writers assert. The smoothness of the upper incisors can however not be regarded as the characteristic of a distinct group, nor does their grooved state enable us to separate the species which present such peculiarities from their congeners. Of the nineteen species only two show the latter characteristic, viz: *Sciurus rufo-brachiatus* and *getulus*.

Although many attempts have been made to divide the Squirrels into distinct restricted groups, only a few of them can stand a more critical inquiry, as these sections have been for the greater part based upon inconstant and accidental characters and on the other hand upon inexact and partly fancyful observations. As to the African Squirrels I only admit two distinct groups, viz: the genera SCIURUS and XERUS and I believe that it will be prudent to content ourselves provisionally which these two sections as up to this time hardly anything is known about the habits of these animals and as the skeletons and the other inner parts have even not yet been studied. Prof. Peters is the only author who gives some accounts of the anatomy of a couple of his new African Squirrels.

I have endeavored to bring all the African Squirrels hitherto described under one or other of my species, but I do not know to what species may belong *Sciurus abessinicus* Thevenot, described in »les Voyages aux Indes Orientales, 1789, Chap. V. p. 34". He says »son poil est long et »rude et d'un roux noirâtre. Celui du ventre et des pieds »de devant est gris comme le poil du lièvre..... Les »Hollandais l'avaient acheté d'un Abyssin..... Il est »trois fois plus grand que ceux que nous avous en France". I never saw a Squirrel of a similar size!

Sciurus.

Fur soft. Ears [1]) well developed. Claws curved. Fourth toe the longest. Palate short, not extending further backwards than the hind-most molars. Jugalia compressed. Tail generally cylindrical [2]).

Although the hairs, contrary to what obtains in the genus *Xerus*, are circular in circumference and never channelled, there are however varying degrees in the softness of the fur. Certain *Sciuri* are rough to the touch in consequence of several bristle-like hairs being interspersed among the soft ones. This is especially the case in the largest species. Other species have the fur as soft and dense as possible; and this is especially to be found in the smallest species. In the majority there is no trace of peculiar colored stripes or streaks on the body, others present very distinct longitudinal stripes of a whitish or blackish color ornating the back or sides of the body. Some species have the under-parts of the body sparingly covered with hairs, in other species those parts are quite as hairy as the upper parts.

As to coloration the different specimens of a given species are apt to vary, sometimes even in a very high degree, as will be obvious from the descriptions. About forty species of this genus have been described by the different authors as living in Africa. I refer them to sixteen species.

One species, *Sciurus getulus*, has been met with only in N. W. Africa, nine are exclusively inhabitants of W. Africa, four exclusively of E. Africa, whereas only two species,

1) In my descriptions I give no measures of the ears, as they have no importance at all if taken from dried skins.

2) The form (cylindrical or distichous, depressed) of the tail is a very good characteristic for distinguishing species, but it can rarely be properly applied to the study of mounted specimens. As only a small number of squirrels have as yet been preserved in spirits, I prefer to leave this characteristic out of consideration in my descriptions of the species of this Genus. The species of the Genus *Xerus* always present the tail distichous.

Sciurus annulatus and *congicus* live both in West and in East Africa. The greatest number of species is found in West Africa about two degrees North and South of the Equator.

In order to simplify the revision of the different species I propose to divide them in the following groups:

A. Squirrels with a single very small stripe on each side or without stripes on back or sides.

B. Squirrels with two stripes on each side.

C. Squirrels with several stripes on back and sides.

α. Fur soft.

β. Fur harsher.

A. Squirrels with a single very small stripe on each side or without stripes on back or sides.

Sciurus stangeri.

1842. *Sciurus stangeri* Waterhouse. Proc. Zool. Soc. London. p. 127; Ann. and Mag. Nat. Hist. X. p. 202.

1849. *Sciurus stangeri* Fraser. Zoologia typica. Plate 23.

1853. *Sciurus caniceps* Temminck (non Gray). Esquisses sur la côte de Guiné. 1e partie. p. 127.

1860. *Sciurus nordhoffi* Du Chaillu. Proc. of the Boston Soc. of Nat. Hist. p. 363; *Sciurus eborivorus* Du Chaillu. l. c. p. 363; *Sciurus subalbidus* Du Chaillu. l. c. p. 365.

1861. *Sciurus nordhoffii*, *eborivorus* and *subalbidus* Gray. Proc. Zool. Soc. London. p. 276.

1867. *Macroxus stangeri* Gray. Ann. and Mag. of Nat. Hist. XX. p. 326; *Macroxus caniceps* Gray (not Gray 1842), l. c. p. 327; *Macroxus rufobrachiatus* Gray. l. c. p. 328 (partim).

1874. *Sciurus calliurus* (Buchholz) W. Peters. Monatsber. d. K. Pr. Akad. d. Wissch. Berlin. p. 707.

1876. *Sciurus calliurus* Peters. Monatsb. d. K. Pr. Ak. d. Wiss. p. 476. pl. I.

1878. *Sciurus temminckii* Anderson. Yunnan Expedition. p. 229. Note.

1880. *Sciurus stangeri* Huet. Nouv. Arch. du Museum. p. 142 (partim).

1880. *Heliosciurus stangeri* Trouessart. Catalogue des Rongeurs viv. et foss. p. 82 (partim); *Heliosciurus gambianus* Trouessart. l. c. p. 83 (partim).

1881. *Sciurus temminckii* Jentink. Notes from the Leyden Museum. p. 65.

An abrupt line of demarcation between the hairs of the sides and the scarcely hairy abdomen characterizes this species. It is one of the largest African Squirrels, with strongly developed incisors.

It presents a highly different hue according to season and age. If not yet in full dress it agrees with the description and figure given by Fraser and Waterhouse and may be described as follows: all the hairs of the upper parts and sides of body are black with two broad yellowish white rings; towards the fore feet one of these rings disappears, likewise on the head above and beneath; towards the hind-feet there are several reddish rings on the hairs. The under parts are scarcely hairy, the hairs being short and blackish with a yellowish ring. The root of the bushy tail is of the same color as the back, but each hair has several reddish rings. The hairs of the tail are black with four pure white rings and a white tip, forming on the upper parts of the tail numerous alternate bands of black and white, indistinct towards the apex. On the back several wholly black hairs are interspersed.

When in full dress all the hairs of the upperparts become glossy. The number of rings to the hairs of the corresponding parts of the body are the same, but the whitish or yellowish white rings on the back, sides of the body, hind-legs and root of tail have turned to bright red; on the fore-feet, upper part of head and cheeks to pure white. The fore part of the shoulders, the breast, inside of fore-legs, middle of belly and a small band bordering the above named line of demar-

cation between the sides of the body and the abdomen are changed into a pure white. The remaining parts of the belly and the inside of the hind-legs are scantily covered with reddish hairs. The white rings of the tail have turned red, but the tip of each hair has remained pure white, thus the tail seen from above shows alternate bands of black, white and red.

Between the two described modes of coloration there are several stages, described as different species by the several authors.

The ears are covered with short hairs. Whiskers long, black. Eyes dark brown. A red or reddish spot behind the ears.

	m. m.
Length of head and body	331
» » tail without tuft	333
» » » with tuft	418
» » hind foot	69
» » skull	71
Width of skull between the jugalia	42
» » » » » orbits	21
Length of upper molar series	12
Distance between incisor and first upper molar	18

There are four molars in each jaw. Incisors very stout, not grooved, bright orange. It must here be remarked that Prof. Peters states in his description of *Sciurus calliurus* Buchholz: »die oberen Schneidezähne haben eine ein»zige mittlere Längsfurche. Der vorderste obere Backzahn »ist nur ein ganz feines, nicht über das Zahnfleisch her»vorragendes Stiftchen". Prof. Peters now agrees with me that this scarcely perceptible impression can hardly be called a longitudinal groove and also that the small fifth supposed upper molar must be considered as a spurious tooth, which is not even placed in the teeth-row. Moreover this type-specimen is not fullgrown, the hindmost molars being not yet entirely developed, and finally I saw another skull in the collection under the care of Prof. Peters, which belongs to a specimen entirely

agreeing externally with the type of *Sc. calliurus* but presenting neither the indistinct grooved upper incisors nor the small fifth upper molar-tooth. Giebel (Zeitschrift f. d. ges. Naturwissensch. 1877, II, p. 310) asserts that *Sciurus stangeri* has grooved upper incisors like *Sciurus bicolor*, *insignis*, *plantani* and *griseus*, but I am convinced that the species which Giebel studied were wrongly labelled, for not a single of the named species presents this character.

N. i. Ncongo, Mboko (Du Chaillu).

Hab. Bavia and Soforé-Place, St. Paul-river, Liberia (Büttikofer and Sala); Gold-coast, Dabocrom (Pel); Calabar (Laurein); Gaboon (Buchholz), Dongila (Laglaize, Verreaux); source of the Ovenga-river and near the Ashira prairies (Du Chaillu); Ogobai-river, Mungo, Mbusa (Buchholz, Fischer); Fernando-Po (Fraser, Thompson, Burton, Du Chaillu).

Pel has found this species in the extensive forests towards the frontiers of Fantee. It does not appear in the neighborhood of the coast. Du Chaillu relates that it is found in the mountainous country situated near the Ashira prairies at a distance of one hundred and fifty miles from the coast and in the mountains of the interior where the Ovenga-river has its source. It is not met with on the seashore. Du Chaillu named it *ivory-eater* and says that it shows a curious partiality for ivory, and loves to feed on the newly fallen tusks of the elephant, but does not touch them after they have lain on the ground long enough to lose the animal matter; many tusks are found with the marks of its teeth. Büttikofer writes that this species feeds on nuts of the oil-tree. There are other Rodents which also show this curious appetite for hard animal matter, for instance Du Chaillu relates that the Porcupine of West Africa is said by the natives to feed sometimes on the tusks of the elephant and I saw in the Stuttgart collection a piece of a deer's antler, which was gnawed by the common European Squirrel. Mr. Liebe (Der Zoologische Garten, 1881, N°. 3, p. 93) supposes that squirrels

and other gnawing animals gnaw stones, shells and other hard substances for the purpose of shortening the incisors.

Mounted specimens in the Leyden Museum:

1. Adult male, Soforé-place, St. Paul-river, Liberia (Büttikofer and Sala), killed 3 May 1880. — 2. Adult female, Bavia, St. Paul-river (Büttikofer and Sala), killed 28 February 1880. — 3 and 4. Adult males, Dabocrom, Gold-coast (Pel), killed May 1849. — 5. Adult female, Dabocrom, Pel, 1849. — 6. Adult male, Gaboon, Frank, 1865. — 7. Adult male, Ogobai, W. Schlüter. — 8. Young male, Ogobai, W. Schlüter. — 9. Adult male, West Africa, Frank, 1880. — 10 and 11. Adulte male and female, Fernando-po.

12. Skull of n°. 6. — 13. Skull of n°. 7. — 14. Skull of n°. 8. — 15. Skull of n°. 9. — 16. Skull of n°. 11. — 17. Skull, Gold-coast, Pel. — 18. Skull, Ashantee, Frank, 1880.

Nos. 3, 4 and 5 are the type-specimens of *Sciurus caniceps* Temminck. — N°. 6 received s. n. *Sciurus eborivorus* Du Chaillu. — Nos. 7 and 8 received s. n. *Sciurus nordhoffi* Du Chaillu. — N°. 11 agrees in coloration wholly with *Sciurus stangeri* Waterhouse.

Sciurus ebii.

1853. *Sciurus ebii* Temminck. Esquisses Zool. sur la côte de Guiné, 1e partie, p. 129.

1860. *Sciurus wilsoni* Du Chaillu. Proc. Boston Soc. of Nat. Hist., Vol. VII, p. 364.

1861. *Sciurus wilsonii* Gray. Proc. Zool. Soc. London, p. 276.

1867. *Macroxus wilsonii* Gray. Ann. and Mag. of Nat. Hist. XX, p. 328; *Macroxus pyrrhopus* var. *erythrops* Gray, l. c. p. 330 (partim.)

1880. *Sciurus stangeri* Huet. Nouv. Arch. du Museum, p. 142 (partim); *Sciurus ebii* Huet, l c., p. 148.

1881. *Heliosciurus stangeri* Trouessart. Catalogue des Rongeurs viv. et foss. p. 82 (partim); *Heliosciurus erythrogenys* Trouessart, l. c. p. 83 (partim).

Fur short. Back blackish olivaceous, head and limbs red, tail brownish-black or black. It resembles the foregoing species in external appearance, but there are such striking differences in the distribution of the colors, shortness of the fur and form of the skull, that it cannot be confounded either with *Sciurus stangeri* or with any other Squirrel.

Hairs of back, sides and upper parts of fore-limbs mouse-colored at the base, then white, black, yellowish red and a hardly visible blackish tip. Hairs of head and upper parts of hind legs conspicuously red tipped. Lower parts of limbs, feet, inside of limbs, ears and sides of head shining red. Belly, breast and throat scarcely covered with yellowish red hairs. The bushy tail is at its root colored like the back, further on each hair is black with three white rings and a white tip, towards the apex the rings diminish in number and the white rings grow red and at the apex the hairs are red with long black or blackish-brown tips. Whiskers black.

The type of *Sciurus wilsoni* Du Chaillu and two other individuals in the British Museum from Ashantee agree wholly with the typical specimens of Temminck's *Sciurus ebii* in our collection.

	m. m.
Length of head and body.	290
» » tail without tuft	280
» » » with tuft	360
» » hind foot	65,5
» » skull	69
Width of skull between the jugalia	36
» » » » » orbits	19
Length of upper molar series.	10
Distance between incisor and first upper molar. .	18

There are four molars in each jaw. Cutting-teeth not grooved, orange. The form of the skull is smaller and more elongate than in *Sciurus stangeri*, nasalia longer. Further differences will been found in comparing the measures above given with those of *Sciurus stangeri*.

Hab. Gold-coast, Dabocrom (Pel), Ashantee (Aubinn); source of the Ovenga-river (Du Chaillu).

According to Pel this rare Squirrel frequents the same localities as *Sciurus stangeri*. Du Chaillu has found it in the mountainous country situated on the head waters of the Ovenga-river, where it lives among the trees.

Mounted specimens in the Leyden Museum:

1 and 2. Adult male and female, Dabocrom, Gold-coast (Pel), killed in June, type-specimens.

3 and 4. Skulls of Nos. 1 and 2.

Sciurus aubinnii.

1873. *Macroxus aubinnii* Gray. Ann. and Mag. Nat. Hist. XII, p. 65.

1881. *Heliosciurus aubinnii* Trouessart. Catalogue des Rongeurs viv. et foss. p. 84.

1881. *Sciurus salae* Jentink. Notes from the Leyden Museum, p. 63.

Distinguished from all its congeners by the uniform grizzled aspect of all the hairs of upper and under parts and by the slender black tail.

Head and body above and below grizzled, each hair being black with one or two brown rings. Among these rings there are a few broader ones on the middle of the belly and inside of legs, those parts thus showing a browner hue. Outside of legs colored like back, towards the feet the hairs grow shorter. Tail black above, down to the last caudal vertebrum, the long tuft being nearly brownish throughout, in consequence of the very broad brownish rings to the hairs. Under parts of tail present a grizzled aspect along the middle, broadly boardered with black.

When in full dress a broad black band runs along the middle of the back and joins the black tail. The feet are blacker and the toes are wholly black.

Whiskers long, black. Ears short, rounded, thickly

covered with short black hairs, with a small subterminal brownish ring. Eyes black. No lighter colored spot behind the ears.

	m. m.
Length of head and body.	270
» » tail with tuft.	390
» » » without tuft.	325
» » hind foot	65
» » skull.	58
Width between the jugalia	34
» » » orbits	17
Length upper molar series	11
Distance between incisor and first upper molar . .	13

There are five molars in each upper, four in each lower jaw. The first upper molar is more developed than is usually the case with this generally small molar. Incisors slender, ungrooved, orange colored.

After having seen Gray's type of this species I am convinced that my *Sciurus salae* is the same squirrel but in its full dress.

N. i. Bushcat (Büttikofer and Sala).

Hab. Liberia, St. Paul-river, Bavia; Soforé-place, Bendo (Büttikofer and Sala); Gold-coast, Fantee (Aubinn).

The natives distinguish this species very well and give it the name *Bush-cat* pretending that it is not a *Squirrel*. It lives in cavities of trees.

Mounted specimens in the Leyden Museum:

1. Adult male, Soforé-place, St. Paul-river, Liberia, killed 15 May 1880, Büttikofer and Sala. — 2. Adult male, Soforé-place, 16 May 1880, Büttikofer and Sala. — 3. Adult male, Soforé-place, 25 May 1880, Büttikofer and Sala. — 4. Adult female, Soforé-place, 5 July 1880, Büttikofer and Sala. — 5. Adult female, Bavia, St. Paul-river, 13 March 1880, Büttikofer and Sala. — 6. Adult male, Bendo, Fisherman-lake, 3 December 1880, Büttikofer and Sala.

7. Skull of n°. 2. — 8. Skull of n°. 3. — 9. Skull of n°. 6.

Sciurus rufo-brachiatus.

1842. *Sciurus rufo-brachiatus* Waterhouse. Proc. Zool. Soc. London. p. 128; *Sciurus rufo-brachium* Waterhouse. Ann. and Mag. Nat. Hist. X. p. 202.

1849. *Sciurus rufobrachiatus* Fraser. Zoologia typica. pl. 24.

1853. *Sciurus maculatus* Temminck. Esquisses Zool. sur la côte de Guiné. 1e partie. p. 130; *Sciurus rubrobrachiatus* Temminck. l. c. p. 136.

1867. *Sciurus aubryi* Alph. Milne Edwards. Rev. et Mag. de Zoologie. p. 228.

1867. *Macroxus rufobrachiatus* Gray. Ann. and Mag. Nat. Hist. XX. p. 328 (partim); *Macroxus isabellinus* Gray. l. c. p. 329.

1867. *Funambulus rufobrachium* Fitzinger. Sitzb. d. K. Akad. d. Wissensch. p. 33.

1880. *Sciurus rufobrachiatus* Huet. Nouv. Arch. du Museum. p. 144 (partim); *Sciurus aubryi* Huet. l. c. p. 150.

1881. *Heliosciurus gambianus* Trouessart. Catalogue des Rongeurs viv. et foss. p. 82 (partim); *Heliosciurus annulatus* Trouessart. l. c. p. 83 (partim); *Heliosciurus aubryi* Trouessart. l. c. p. 84.

This species is characterized by having the upper parts grizzled, the under parts red and the upper incisors grooved.

Hairs of the upper surface of the head, neck, sides of the collar, upper parts and sides of body and outside of limbs glossy black with two olivaceous yellow rings; the subapical one is the smallest. Inside of legs wholly red. Chin, throat, breast and belly yellow or reddish, each hair being black at its base. Hairs of the very bushy tail repeatedly ringed with black and white, the tips being always white, except towards the apex of the tail, where the hairs are conspicuously tipped with black. The tail is not always clearly banded. Young specimens are colored like the adult ones.

In some individuals instead of the black color a more brownish or reddish tinge prevails: they must be regarded as moulting stages.

Fur of the back longer and denser than that of the belly. Ears sparingly hairy. Whiskers black, short. Eyes black.

	m.m.
Lenght of head and body	282
» » tail with tuft	320
» » » without tuft	270
» » hind foot	56
» » skull	57.5
Width between the jugalia	33
» » „ orbits	19
Length upper molar series	11
Distance between incisor and first upper molar	12.75

There are four molars in each jaw. Upper incisors orange or yellowish red: they are longitudinally grooved. The depth however of this groove varies considerably. In some specimens another depression is to be found close to the inner border of the upper incisors, as Gray and Peters have remarked.

Hab. Liberia, St. Paul-river, Soforé-place and Bavia; Fisherman-lake, Bendo (Büttikofer and Sala); Gold-coast (Nagtglas), Saccondé, Rio Boutry (Pel); Calabar (Laurein), Cameroon-mountains, Aqua-town (Reichenow); Gaboon (Aubry-Lecomte, Verreaux, Laglaize), Dongila (Buchholz); Fernando-po (Fraser); Angola, Kuango (v. Mechow).

It frequents the woody banks of the rivers.

The type of *Sciurus aubryi* Alph. Milne Edwards is a young individual and Prof. A. Milne Edwards told me that he did not believe it to be a good distinct species, but that it is the young of *Sciurus rufo-brachiatus*, in which opinion I entirely agree with him. *Macroxus isabellinus* Gray also belongs to this species. I have examined the very incomplete skull, but could clearly make out that there is no trace of a fifth molar in the upper jaw and that the upper incisors show a slight groove.

Mounted specimens in the Leyden Museum:

1. Adult female, Liberia, St. Paul-river, Soforé-place, 20 April 1880 (Büttikofer and Sala). — 2. Adult male, Soforé-place, 19 May 1880 (Büttikofer and Sala). — 3. Adult male, Soforé-place, 4 September 1880 (Büttikofer and Sala). — 4. Adult female, Soforé-place, 14 September 1880 (Büttikofer and Sala). — 5. Adult male, St. Paul-river, Bavia, 18 February 1880 (Büttikofer and Sala). — 6. Adult male, Fisherman-lake, Bendo, 23 November 1880 (Büttikofer and Sala). — 7. Young male, Bendo, 24 November 1880 (Büttikofer and Sala). — 8. Adult, Liberia, died in the Zoological Gardens at Rotterdam, 1878. — 9 and 10. Adult males, Gold-coast, Rio Boutry (Pel). — 11. Adult female, Rio Boutry (Pel). — 12. Adult male, Gold-coast, Saccondé, 25 April 1842 (Pel). — 13. Young female, Rio Boutry (Pel). — 14. Adult male, Gold-coast, 1861 (Nagtglas). — 15. Adult, neighborhood of Cameroon-mountains, Frank, 1880. — 16 and 17. Adult male and female, Fernando-po. — 18. Half grown male, Fernando-po.

19. Skull of N° 8. — 20. Skull of N° 9. — 21. Skull of N° 11. — 22. Skull of N° 12. — 23. Skull of N° 15. — 24. Skull of N° 17.

N^os^ 9, 10, 11, 12 and 13 are the type-specimens of *Sciurus maculatus* Temminck.

Sciurus palliatus.

1852. *Sciurus palliatus* Peters. Monatsb. d. K. Pr. Akad. d. Wissensch. Berlin. p. 273; Reise nach Mossambique. Zoologie. I. Säugethiere. p. 134. pl. XXXI, fig. 1 and pl. XXXII, fig. 3.

1864. *Sciurus ornatus* Gray. Proc. Zool. Soc. London. p. 13. pl. I.

1867. *Macroxus palliatus* Gray. Ann. and Mag. Nat. Hist. XX. p. 330.

1867. *Funambulus palliatus* Fitzinger. Sitzb. d. K. Akad. d. Wissensch. p. 34.

1873 *Macroxus annulatus*, var. *Frerei* Gray. Ann. and Mag. Nat. Hist. XII. p. 265.

1881. *Heliosciurus palliatus* Trouessart. Catalogue des Rongeurs viv. et foss. p. 83 (partim); *Heliosciurus multicolor* Trouessart. l. c. p. 83 (partim).

Upper parts of head and body and of the outside of limbs and the root of tail black, sprinkled with yellow and rusty red, showing a banded aspect. The remaining parts of head, body, limbs and the tail are also rusty red.

Each hair of head, back, outside of body and of limbs is black with a broad yellow, rusty brown or rusty red subapical ring; a few hairs are black throughout. Among the similarly colored hairs of the root of the tail there are some with two lighter colored rings and others with yellow or rusty red tips. The rusty red hairs of the belly and limbs are uniform throughout: those of the underparts of the tail and also of its apex are rusty red, the other hairs of that organ have a broad black ring, which towards the apex occupies a lower place on the hairs.

Macroxus annulatus, var. *Frerei* Gray is a young individual; the hindmost molars being not yet developed. The hairs of the upper parts have a dusky white subapical ring. Those of the middle part of the tail are annulated with black and whitish yellow, the tips however are constantly colored rusty red. A small fifth upper molar tooth is present and it can never be looked upon as a variety of *Sciurus annulatus*, where that small tooth is always wanting.

The figure of *Sciurus palliatus* given by Prof. Peters is that of a young specimen, the adult female is not to be found in the collection of the Berlin Museum; the skull of the latter however is present, although in a very bad state of preservation as nearly all the molars as well as the incisors are wanting. There is however an adult specimen from Zanzibar in the Berlin collection agreeing in all parts with the description given by Peters, except the hairs of the tail which show four black rings.

The type specimens of *Sciurus ornatus* Gray are of a brighter red color.

Whiskers black. Eyes dark-brown. Ears with short, dense fur.

	m. m.		
Length of head and body . . .	185		
» » tail with tuft	140		
» » hind foot	47		
		Paris	*Museum.*
» » skull	48	. .	51.5
Width between the jugalia . . .	27.5	. .	29
» » » orbits . . .	13	. .	16
Length of upper molar series . .	8.75	.	
Distance between incisor and first upper molar	10.5		

There are five upper molars in each jaw and four lower ones.

The smooth incisors are yellow-brown or orange-red.

N. i. Poculuti (Gray).

Hab. Galla-land and Pangani-river (Paris Museum); Dana-river, Muniuni (Fischer); Zanzibar (Bartle Frere, Hildebrandt); Mossambique, Mossimboa and Quitangonha (Peters); Natal (Fosbrooke).

No specimen in the Leyden Museum.

Sciurus mutabilis.

1852. *Sciurus mutabilis* Peters. Monatsb. d. K. Pr. Akad. d. Wisschensch. Berlin. p. 273; Reise nach Mossambique. Zoologie. I Säugethiere. p. 131. pl. XXX and pl. XXXII. fig. 2.

1867. *Macroxus stangeri*, var. *mutabilis*(?) Gray. Ann. and Mag. Nat. Hist. XX. p. 326.

1867. *Funambulus mutabilis* Fitzinger. Sitzb. d. K. Akad. d. Wissensch. p. 34.

1881. *Heliosciurus stangeri* Trouessart. Catalogue des Rongeurs viv. et foss. p. 82 (partim).

Upper parts of snout, cheeks, sides of throat and sides

of the foremost part of the body and outside of fore legs the fore feet included, black speckled with brownish yellow; upper parts of head, collar, and middle part of the back glossy brown black. The whole hindmost part of the body, the hind legs included, is yellowish rusty brown. Foremost part of breast and inside of fore limbs yellowish white, lower parts of chin and throat rusty colored like the belly. Feet black, tipped with white. Tail black indistinctly banded with yellowish white, towards the apex rusty red.

Each hair of the foremost part of head and of the foremost parts of the sides of the body is black with a yellowish white or brownish yellow subterminal ring, sometimes there is another similar ring more downwards at the base of the hair. The woolly hairs are also black with a broad yellowish brown subterminal ring. The hairs of the upper parts of head and collar are black-brown throughout, a few however have a small bright-brown subterminal ring; the hairs of the middle part of the back are brown-black throughout; those of the hind parts of the body are rusty brown with one or two yellowish rings, dark-brown at the base, but among them there are shorter ones ringed with black and white or black throughout. Each hair of the tail is ringed with black and white, the tip broadly pointed with black. Towards the apex of the tail there are to be found some rusty colored hairs: the apex however is wholly rusty red, the base of the hairs being dark-brown.

Whiskers black. Eyes dark-brown. Ears with short hairs.

	m. m.
Length of head and body.	200
» » tail with tuft	300
» » hind foot.	55
» » skull	50
Width between the jugalia	28.5
» » » orbits.	16
Length of upper molar series.	10
Distance between incisor and first upper molar .	11

There are five molars in each upper, four in each lower jaw. Incisors ungrooved, honey-yellow.

The type-specimen of this species is now in the Berlin Museum, but I could not inspect the skull; there still is a skull in the skin, but this skull seems to be in a very bad condition, the lower incisors being absent, and moreover Prof. Peters cannot say with certainty whether that skull does indeed belong to the individual, the true skull having perhaps been lost in the time of Prof. Peters' predecessor.

It is not without hesitation that I here introduce this species, as I am convinced that it is based upon a specimen which is moulting. But as it at present is an impossibility to decide to what fully dressed species it may belong and because it cannot be confounded with the other hitherto known species [1]) from the East Coast of Africa, the above given short extract of Prof. Peters' exact description will suffice to bring it under the attention of naturalists.

N. i. Injerêre (Peters).

Hab. Mossambique, Boror, Tipino (Peters), Murchison Rapids, River Shire, Zambesi valley, Sena (Kirk).

It frequents high trees, called *mucondocondo* by the Negros.

It feeds on the soft fruits of this tree. Very frequent in »Mopane" forests (Kirk).

No specimen in the Leyden Museum.

Sciurus shirensis.

1867. *Macroxus shirensis* Gray. Ann. and Mag. of Nat. Hist. XX. p. 327.

1881. *Heliosciurus stangeri* Trouessart. Catalogue des Rongeurs viv. et foss. p. 82 (partim).

1) It can in no case belong to *Sciurus stangeri* Wat. as Gray and Trouessart seem to believe, for it has five upper molars in each jaw and not four as is the case in the latter species and besides the other differences nobody has hitherto met with a specimen of *Sciurus stangeri* Wat. on the East Coast of Africa.

Upper parts closely punctulated with black and white, under parts dirty yellow, bi-colored.

Hairs of the head above, upper parts and sides of the body and outside of legs brownish black with two white rings, except those of the feet which have but a single white ring. Root and body of the tail with four white and four black rings, the points being always white. The hindmost part of the back and the tail towards its apex darker colored, the apex is black throughout with a light brown tinge. Chin, throat, chest, belly and inside of limbs dirty yellow, light brown at the base of the hairs.

The young individual, collected by Dr. Livingstone, shows head and extremities lighter colored, but on the back the hairs have a reddish brown hue, with a broad whitish yellow subterminal ring. The under parts bear a lighter color.

Whiskers black. Ears covered with short hairs.

	m. m.
Length of head and body.	250
» » tail with tuft	290
» » » without tuft	220
» » hind foot.	57
» » skull (incomplete) . . . . . about	56
Width between the jugalia	32
» » » orbits	18
Length upper molar series.	11
Distance between incisor and first upper molar. .	12.2

There are four molars in each jaw. The smooth incisors orange colored.

Hab. Shire-river (Dr. Livingstone).

No specimens in the Leyden Museum.

This species cannot be confounded with *Sciurus annulatus* as it presents a wholly different mode of coloration and as it is distinct from the other East African large sized Squirrels by having four molars in each jaw.

Sciurus punctatus.

1853. *Sciurus punctatus* Temminck. Esquisses Zool. sur la côte de Guiné. 1e partie. p. 138.

1867. *Macroxus punctatus* Gray. Ann. and Mag. of Nat. Hist. XX. p. 328.

1880. *Sciurus rufobrachiatus* Huet. Nouv. Arch. du Museum. p. 144 (partim).

1881. *Heliosciurus gambianus* Trouessart. Catalogue des Rongeurs viv. et foss. p. 82 (partim).

Fur uniformly grizzled, tail clearly banded. Under parts bi-colored.

The hairs of the upper parts of head and body, sides of body and upper parts of limbs are black with two olivaceous yellow rings, those of the feet with one ring. Hairs of tail repeatedly ringed with black and brownish red, the tips being white; the apex of the tail black or rusty brown. There are several transitions in coloration of the rings of the hairs in the different individuals, in some specimens they are even rusty red and the white tips of the hairs of the tail are also turned rusty red; that organ seen from above being banded as follows: black, white and red, or black and rusty red. Hairs of the belly tipped with white.

Whiskers black. Eyes black. Ears with short brownish or reddish hairs.

	m. m.
Length of head and body	190
» » tail with tuft	275
» » » without tuft	215
» » hind foot	43
» » skull	44
Width between the jugalia	27
» » » orbits	14
Length of upper molar series	7
Distance between incisor and first upper molar	9.25

There are four molars in each jaw. Incisors smooth, orange colored.

Hab. Banana-islands (Leyden Museum); Liberia, Soforéplace, St. Paul-river, Buluma (Büttikofer and Sala); Ashantee (British Museum); Gold-coast, Rio Boutry, Dabocrom (Pel), Elmina (Nagtglas), Aburi (Reichenow); Fantee (Leyden Museum); Gaboon, Dongila, Limbareni (Buchholz); Ogobai (Du Chaillu); Chinxoxo (Dr. Falkenstein).

Mounted specimens in the Leyden Museum:

1. Adult female, Banana-islands, died in the Zoological Gardens at Rotterdam, 1878. — 2 and 3. Adult males, Liberia, St. Paul-river, Soforé-place, 3 May 1880, Büttikofer and Sala. — 4 and 5. Adult females, Gold-Coast, Dabocrom, June and July, Pel. — 6. Adult male, Dabocrom, Pel. — 7 and 8. Adult females, Gold-Coast, Rio Boutry, June, Pel. — 9. Adult male, Gold-Coast, Elmina, July 1861, Nagtglas. — 10. Adult male, Fantee, Frank, 1880. — 11 and 12. Male and female (in spirits), Buluma, 20 April 1881, Büttikofer and Sala.

13. Skull of n° 2. — 14. Skull of n° 4. — 15. Skull of n° 5. — 16. Skull of n° 6. — 17. Skull of n° 7.

N^os^ 4, 5, 6, 7 and 8 are the type-specimens of the species.

Sciurus annulatus.

1820. *Sciurus annulatus* Desmarest. Mammalogie. Première partie. p. 338.

1835. *Sciurus gambianus* Ogilby. Proc. Zool. Soc. London. p. 103.

1835—1840. *Sciurus multicolor* Rüppell. Neue Wirbelthiere. p. 38. pl. 13.

1845. *Sciurus annularis* Schinz. Synopsis Mammalium. Zweiter Band. p. 14.

1853. *Sciurus annulatus* Temminck. Esq. Zool. sur la Côte de Guiné. 1^e^ partie. p. 137; *Sciurus gambianus* Temminck. l. c. p. 140.

1867. *Macroxus annulatus* Gray. Ann. and Mag. Nat. Hist. XX. p. 329 (partim).

1867. *Funambulus gambianus* Fitzinger. Sitzb. d. K. Akad. d. Wissensch. p. 33; *Funambulus annulatus* Fitz. l. c. p. 33; *Funambulus multicolor* Fitz. l. c. p. 34.

1877. *Sciurus bongensis* v. Heuglin. Reise N. O. Afrika T. II. p. 59.

1880. *Sciurus rufobrachiatus* Huet. Nouv. Arch. du Mu-

seum. p. 144 (partim); *Sciurus annulatus* Huet. l. c. p. 150; *Sciurus multicolor* Huet. l. c. p. 152 (partim).

1881. *Heliosciurus gambianus* Trouessart. Catalogue des Rongeurs viv. et foss. p. 82 (partim); *Heliosciurus annulatus* Trouessart. l. c. p. 83 (partim); *Heliosciurus multicolor* Trouessart. l. c. p. 83 (partim); *Heliosciurus bongensis* Trouessart. l. c. p. 84.

Upper parts grizzled, under parts uniformly dirty white or light rusty red; four upper molars in each jaw.

Hairs of head above, back and sides of the body and outside of the upperparts of the limbs mouse-colored at the base, then rusty yellow, black, yellowish white and with a small black tip. Outside of the lower parts of the limbs rusty yellow, blackish at the base. Hairs of chin, throat, chest, belly and inside of legs dirty white throughout. Tail seen from above annulated with numerous alternate bands of black and light rusty yellow; each hair repeatedly ringed with the named colors, the points however always bearing the latter color. This is the mode of coloration of the West-African specimens. The greater part of the specimens of East-Africa however generally show a more light rusty red tinge, the hairs being ringed with that color instead of with rusty yellow and the under parts also are uniform reddish white. One of the specimens collected by v. Heuglin in Abyssinia and now in our collection presents in all respects the same mode of coloration as the West African individuals.

Whiskers black. Ears with short, dense fur, dirty yellow colored. A yellowish white circle round the eyes.

	m.m.
Length of head and body	247
» » tail with tuft	310
» » » without tuft	250
» » hind foot	50
» » skull (incomplete) about	50

	m.m.
Width between the jugalia	28
» » » orbits	15
Length of upper molar series	9
Distance between incisor and first upper molar	10

There are four molars in each jaw. The smooth incisors are of an orange or honey-yellow color.

This species can only be confounded with *Sciurus punctatus* and *cepapi*, but is easily distinguished from *Sciurus punctatus* by its larger size and longer tail and by the uniformly colored under parts of the body, from *Sciurus cepapi* by its larger size and by having four molars in each jaw and not five as is the case in that species.

The type-specimen of Desmarest's *Sciurus annulatus* is not to be found in the Museum du Jardin des Plantes. According to Prof. Alph. Milne Edwards it was usual with Geoffroy to put a more beautiful specimen of the same species in the place of another if the latter was in a bad state of preservation and in this way the type in question appears also to have been lost. Happily the description given by Desmarest is so clear that there can be no matter of doubt.

N. i. Sakie (Rüppell).

Hab. Gambia (Rendall); Senegal (Perrottet); Quanza-river (Mus. Leyden); Fernando-po (Verreaux); Tigre, Hamedo (Schimper); Abyssinia (Rüppell), Bahr-el-Abiad, Djur and Dembea (v. Heuglin), Sennar (Clot-Bey), Schoa (Rüppell).

Lives on trees, feeds upon fruits and buds.

Mounted specimens in the Leyden Museum:

1. Adult male, Senegambia. — 2 and 3. Adult males, Senegal. — 4. Half grown male, Senegal, 1822. — 5. Adult male, Quanza-river, Frank, 1880. — 6 and 7. Adult females, Abyssinia, Rüppell. — 8. Adult male, Abyssinia, v. Heuglin, 1865. — 9. Young male, Abyssinia, v. Heuglin, 1865. — 10. Adult female, Abyssinia, Paris Museum, 1868.

11. Skull of n° 1. — 12. Skull of n° 6. — 13. Skull of n° 10.

N^os^ 6 and 7 are type-specimens of *Sciurus multicolor* Rüppell. N° 8 is colored like the West-African specimens.

Sciurus cepapi.

1836. *Sciurus cepapi* A. Smith. App. to Rep. of Exp. p. 43.
1838. *Sciurus cepapi* A. Smith. Illustrations of the Zoology of South Africa. plate V.
1843. *Sciurus cepate* Gray. List of the Spec. of Mamm. p. 140.
1843. *Sciurus superciliaris* Wagner. Schreb. Säugethiere. Supplem. Bd. III. p. 212. Note.
1867. *Macroxus annulatus* Gray, Ann. and Mag. of Nat. Hist. XX. p. 329 (partim); *Macroxus congicus* Gray. l. c. p. 331 (partim).
1867. *Funambulus superciliaris* Fitzinger. Sitzb. d. K. Akad. d. Wissensch. I. p. 34; *Funambulus cepapi* Fitzinger. l. c. p. 34 (partim).
1880. *Sciurus mutabilis* Huet (non Peters). Nouv. Arch. du Museum. p. 143; *Sciurus multicolor* Huet. l. c. p. 152 (partim).
1881. *Heliosciurus multicolor* Trouessart. Catalogue des Rongeurs viv. et foss. p. 83 (partim).

This species resembles *Sciurus annulatus* in many respects, especially in the coloration of the upper parts and the uniform color of the under parts of the body. It is however distinguished by its smaller size, shorter tail and by having five molars in each upper jaw.

Hairs of back and sides of the body black with a reddish brown ring and a yellowish brown subapical one. Hairs of upper parts of head blackish with yellowish red points; those of chin, throat, chest, belly and inside of legs are rather long and entirely dirty yellow colored, with a reddish brown tinge. Outside of legs with long hairs dark mouse-colored at the base and largely yellowish red pointed. Hairs of tail reddish yellow with two or three black rings and large reddish yellow tips, forming indistinct bands.

Whiskers black. The well developed ears with short dirty white hairs. A circle of the same color surrounds the dark-brown eyes.

	m. m.
Length of head and body	205
» » tail with tuft	205
» » » without tuft	163
» » hind foot	45
Length of skull (incomplete)	about 45
Width between the jugalia	26
» » » orbits	12
Length of upper molar series	8
Distance between incisor and first upper molar	9

There are five molars in each upper jaw: the fifth is strongly developed. The smooth incisors are orange colored.

N. i. Sindi (Peters).

Hab. Dana-river, Kipini (Fischer); Ukambani, Kitui (Hildebrandt); Mombas and Dar-es-Salam (Kirk); Zanzibar (Grandidier, v. d. Decken); Tette (Peters, Kirk); Limpopo-river (Smith); Masilikats-land (Verreaux, Delgorgue); Damara-land and Miriqua-land (Leyden Museum); Cape (Drege, Verreaux).

Smith relates that the first specimens of this Squirrel were observed upon the banks of the Limpopo-river. The species was occasionally discovered on the ground, but more frequently upon trees; and when it happened to be surprised in the former situation, it invariably endeavoured to reach the latter, and if successful, either attempted to conceal itself in the forks of the branches, or in holes, if any existed, in the trunk, or elsewhere. Its flight, when on the ground, was effected with amazing rapidity, and the perpendicular ascent of the tree was accomplished with equal facility. It feeds by day, and, according to the natives, also by night, and in all the specimens he obtained, the stomachs were fully distended with berries.

Mounted specimens in the Leyden Museum:

1 and 2. Adult male and female, Damara-land. — 3. Adult male, Miriqua-land.

4. Skull of n°. 1. — 5. Skull of n°. 3.

Sciurus poensis.

1830. *Sciurus poensis* A. Smith. South Afric. Quarterl. Journ. XI. p. 64.

1853. *Sciurus poensis* Temminck. Esquisses zool. sur la côte de Guiné, 1e partie, p. 141; *Sciurus musculinus* Temminck, l. c. p. 142.

1857. *Sciurus pumilio* Leconte. Proc. Acad. Philadelphia, p. 11. *Sciurus subviridescens* Leconte. l. c. p. 11.

1867. *Macroxus poensis* Gray. Ann. and Mag. of Nat. Hist. XX. p. 329.

1867. *Sciurus olivaceus* Alph. Milne Edwards. Revue et Mag. de Zoologie. p. 228.

1867. *Funambulus poensis* Fitzinger. Sitzb. d. K. Akad. d. Wissensch. I. p. 34 (partim).

1880. *Sciurus poensis* Huet. Nouv. Arch. du Museum. p. 149, pl. 7, fig. 1; *Sciurus musculinus* Huet. l. c. p. 151.

1881. *Heliosciurus poensis* Trouessart. Catalogue des Rongeurs viv. et foss. p. 84; *Heliosciurus musculinus* Trouessart. l. c. p. 84; *Heliosciurus pumilio* Trouessart. l. c. p. 84.

Easily distinguished from all the other Squirrels by the peculiar color of the fur showing a very striking greenish tinge.

The soft dense fur of the upper parts and sides of the body and the outside of legs is mouse-colored at the base, with a distinct greenish yellow ring and a minute black tip. On the back some wholly black hairs are spread. Hairs of tail black, at its root with numerous greenish yellow rings, further on with two rings of the same color; at the apex of the tail the black tips of the hairs are very large. Hairs of chin, throat, chest, belly and inside of legs mouse-colored, at the base with rather large cinereous green tips, in younger individuals however the hairs have a more white hue. If moulting the mouse-color prevails above and beneath.

Whiskers black. The well developed ears with short greenish brown hairs. The black eyes surrounded by a cinereous green circle.

	m. m.
Length of head and body	190
» » tail with tuft	232
Length of tail without tuft	182
» » hind foot	33
» » skull	38
Width between the jugalia	23
» » » orbits	10.5
Length upper molar series	6
Distance between incisor and first upper molar.	8.25

There are five molars in each upper jaw: the fifth very well developed. Incisors ungrooved, pale orange.

Hab. Liberia, St. Paul-river, Soforé-place (Büttikofer and Sala); Ashantee (British Museum); Gold-coast, Rio Boutry (Pel), Elmina (Nagtglas); Gaboon (Laglaize); Fernando-po (Thompson).

It frequents wooded countries (Pel).

Mounted specimens in the Leyden Museum:

1. Adult male, Liberia, St. Paul-river, Soforé-place, 3 May 1880, Büttikofer and Sala. — 2. Adult female, Soforé-place, 28 May 1880, Büttikofer and Sala. — 3. Half grown male, Soforé-place, 29 May 1880, Büttikofer and Sala. — 4. Adult male, Gold-coast, Rio-Boutry, 1842, Pel. — 5 and 6. Adult male and female, Gold-coast, 1842, Pel. — 7. Half grown individual, Gold-coast, 1842, Pel. — 8. Young male, Gold-coast, 1842, Pel. — 9. Adult male, Gold-coast, Elmina, July 1861, Nagtglas. — 10. Half grown male, Elmina, November 1862, Nagtglas. — 11 and 12. Adult males, Gaboon, Frank, 1854 and 1859. 13. Skull of n°. 2. — 14. Skull of n°. 6.

Nos 4, 5, 6, 7 and 8 are the type-specimens of *Sciurus musculinus* Temminck.

Sciurus minutus.

1861. *Sciurus minutus* Du Chaillu. Proc. of the Boston Soc. of Nat. Hist. VII. p. 366.

1881. *Heliosciurus minutus* Trouessart. Catalogue des Rongeurs viv. et foss. p. 84.

Distinguished by its small size from all the other African Squirrels.

The hairs of the upper and under parts of the body mouse-colored at the base. Those of upper parts of head, of back, outside of legs and sides of the body tipped with bright ferruginous, those of the chin, throat, chest, belly and inside of legs tawny tipped.

The hairs of the tail are rufous, with a blackish ring. Whiskers long and black. Ears, scantily furnished with yellowish white hairs, well developed; length of the ears about 10 m. m.

	m. m.
Length of head and body	75
» » tail with tuft.	50
» » hind foot	19.5
Width between the jugalia (incomplete) . . about	14
» » » orbits (incomplete) . . . about	8.5
Length upper molar series	2.5
Distance between incisor and first upper molar . .	6

There are four molars in each jaw. The smooth incisors are of a yellowish white color.

N. i. Kendo (Du Chaillu).

Hab. It is found on the mountainous range or table-lands situated in the interior along the western coast of Africa, between two degrees north and two degrees south of the equator. Du Chaillu did not meet it in the maritime plains situated between these mountains and the sea.

It is always found on the trees in the forest, and to get a sight of it is most difficult, not only on account of its small size, but of its constant and rapid movements (Du Chaillu).

No specimens in the Leyden Museum; the two known specimens of this beautiful but rare species are preserved in the British and in the Berlin Museum.

B. Squirrels with two stripes on each side.

Sciurus pyrropus.

1833. *Sciurus pyrropus* Fr. Cuvier. Mammifères lithogr. Vol. IV.

1836. *Spermosciurus pyrropus* Lesson. Histoire natur. des Mammifères. T. V. p. 400.

1842. *Sciurus erythrogenys* Waterhouse. Proc. Zool. Soc. London. p. 129; *Sciurus leucogenys* Waterhouse. Ann. and Mag. of Nat. Hist. p. 202.

1843. *Sciurus (Xeros) pyrrhopus* Wagner. Schreber's Säugethiere. Supplem. Bd. III, p. 215.

1843. *Sciurus poensis* Gray. List of specimens of Mammalia. p. 140 (partim).

1849. *Sciurus erythrogenys* Fraser. Zoologia typica, pl. 25.

1853. *Sciurus erythrogenys* Temminck. Esquisses zool. sur la côte de Guiné. 1e partie, p. 130; *Sciurus pyrrhopus* Temminck. l. c. p. 132; *Sciurus leucostigma* Temminck. l. c. p. 133.

1860. *Sciurus rubripes* Du Chaillu. Proc. Boston Soc. of Nat. Hist. VII. p. 366.

1867. *Macroxus pyrrhopus* Gray. Ann. and Mag. Nat. Hist. XX. p. 330 (partim); *Macroxus erythrogenys* Gray. l. c. p. 331.

1867. *Funambulus poensis* Fitzinger. Sitzb. d. K. Akad. d. Wissensch. I. p. 34 (partim).

1880. *Sciurus erythrogenys* Huet. Nouv. Arch. du Museum. p. 155; *Sciurus pyrrhopus* Huet. l. c. p. 157.

1881. *Heliosciurus pyrrhopus* Trouessart. Catalogue des Rongeurs viv. et foss. p. 83; *Heliosciurus erythrogenys* Trouessart. l. c. p. 83 (partim).

Upper parts olivaceous black, legs red, under parts pure white.

Hairs of head above and of back black with a single olivaceous yellow ring, on the hind part of the back with two rings. Hairs of cheeks, sides of collar, outside

of legs and sides of the body mouse-colored at the base, red tipped. A band, somewhat darker colored than the back and running from shoulder to thigh, separates from each red colored side of the body a smaller band [1]) of a lighter color than the sides. Chin, throat, breast, belly and inside of legs covered with pure white hairs. Hairs of the upper parts of tail black with a white ring and a ditto tip; the apex is reddish with large black tips; below, the hairs are broadly red with a black subapical ring and reddish white tips.

Inside of ears red, outside white; a white spot behind each ear. The black eyes are surrounded by a reddish circle. Whiskers black.

In the different specimens of this species there is a great variation in the mode of coloration of the upper parts of the head, the sides of the body and the upper parts of the fore-legs. In some individuals the head is red or brownish red, the sides of the body like the back but with a lighter tinge and the upper parts of the fore legs reddish brown instead of red; in others all these parts have a brownish shade: in some specimens a cinereous tinge prevails. That this curious variation has induced several writers and naturalists to describe mere variations as distinct species needs no demonstration. But it is indeed incomprehensible how this and the following species are so often regarded as belonging to the genus *Xerus*, *Sciurus pyrropus* and *congicus* actually being two of the most softly furred Squirrels which exist.

Length of head and body	235
» » tail with tuft	210
» » » without tuft	165
» » hind foot	45.5
» » skull (incomplete) about	51
Width between the jugalia	28
» » » orbits	12.5
Length of upper molar series	9
Distance between incisor and first upper molar	12

1) In some individuals this band is very indistinct.

There are five upper molars in each jaw: the fifth is very well developed. Incisors smooth, orange colored.

N. i. Ngori (Du Chaillu).

Hab. Senegambia, Casamanza-river (Paris Museum); Liberia, St. Paul-river, Soforé-place and Fisherman-lake, Buluma (Büttikofer and Sala); Ashantee (British Museum); Gold-coast, Dabocrom, Rio-Boutry (Pel), Elmina (Nagtglas, Pel), Accra, Mungo (Buchholz), Akim (Mohr), Akropong (Dieterle), Victoria (Reichenow), Fantee (British and Berlin Museum); Calabar (Laurein); Fernando-Po (Fraser, Montemart); Gaboon (Aubry Lecomte); Rivers Nazareth, Ogobai, Fernando-Vaz, Rembo and Ovenga (Du Chaillu); Angola, Kuango (v. Mechow).

It inhabits the forests.

Specimens in the Leyden Museum:

1. Adult male, Liberia, St. Paul-river, Soforé-place, Büttikofer and Sala, 19 April 1880. — 2, 3 and 4. Very young individuals (in spirits), Liberia, Fisherman-lake, Buluma, January 1881, Büttikofer and Sala. — 5 and 6, Adult males, Gold-coast, Dabocrom, May 1842, Pel. — 7. Adult female, Dabocrom, May 1842, Pel. — 8. Adult female, Dabocrom, February 1843, Pel. — 9, 10 and 11. Adult female and adult males, Dabocrom, 1842, Pel. — 12 and 13. Adult male and female, Gold-coast, Elmina, 1861 and 1865, Nagtglas. — 14. Young individual, Gold-coast, 1865. — 15. Very young specimen, Liberia, died in the Zoological garden at Rotterdam, 1875. — 16. Adult female, Elmina, July 1861, Nagtglas. — 17. Adult female, Gaboon. — 18. Adult female, Ogobai, Schlüter.

19. Skull of n°. 8. — 20. Skull of n°. 9. — 21. Skull of n°. 15. — 22. Skull of n°. 18.

N^os. 5, 6, 7, 8, 9, 10 and 11 are the type-specimens of *Sciurus leucostigma* Temminck. N°. 18 received s. n. *Sciurus rubripes* Du Chaillu.

Sciurus congicus.

1820. *Sciurus congicus* Kuhl. Beiträge zur Zoologie. p. 66.

1836. *Spermosciurus congicus* Lesson. Histoire naturelle des Mammif. T. V. p. 401.

1843. *Sciurus* (*Xeros?*) *congicus* Wagner. Schreber's Säugethiere. Supplem. Bd. III. p. 217. Note.

1852. *Sciurus flavivittis* Peters. Monatsb. d. K. Pr. Akad. d. Wissenschaften. Berlin. p. 274; Reise nach Mossambique, Zoologie, Säugethiere. p. 128. pl. XXIX and pl. XXXII. fig. 4.

1853. *Xerus flavivittis* Temminck. Esquisses Zool. sur la Côte de Guiné. 1e partie. p. 124. Note.

1867. *Macroxus congicus* Gray. Ann. and Mag. of Nat. Hist. XX. p. 330.

1867. *Funambulus congicus* Fitzinger. Sitzb. d. K. Akad. d. Wissensch. I. p. 33; *Funambulus flavivittis* Fitzinger. l. c. p. 34.

1880. *Sciurus ochraceus* Huet. Nouv. Arch. du Museum. p. 154. pl. 7. fig. 2.

1881. *Heliosciurus ochraceus* Trouessart. Catalogue des Rongeurs viv. et foss. p. 84; *Spermosciurus flavivittis* Trouessart. l. c. p. 84; *Spermosciurus congicus* Trouessart. l. c. p. 84 (partim).

Upper parts olivaceous or rusty ochraceous, sides less dark, under parts yellowish white, bi-colored. The more ochraceous tinge, the smaller size and the not wholly whitish colored under parts distinguish this species at once from the former.

The hairs are short and very soft to the touch. There are very striking differences in the mode of coloration of the different specimens, similarly to what was noticed for the foregoing species. The specimens resembling the type of Kuhl agree as to the color of the upper parts with the same parts in *Sciurus pyrropus*, the tail, the sides of the body and outside of legs however are never red, but also olivaceous although not so dark as the upper parts. A white band, bordered by a band somewhat darker colored than the back, runs from shoulder to thigh. The hairs of the under parts and of the inside of the legs bear white tips. A white circle surrounds the eyes. Whiskers black.

The specimens agreeing with *Sciurus flavivittis* Peters are colored as follows: the hairs of upper surface of head, neck and back are black with a subapical rusty ochraceous ring. Hairs of the sides of the body and outside of legs black at the base and for the rest light ochraceous brown or slightly black tipped. A band darker colored than the back and running from shoulder to thigh cuts from each light ochraceous brown colored side of the body a smaller band colored much lighter than these parts. Chin, throat, breast, belly and inside of legs covered with yellowish white hairs, at the base of the hairs nearly always blackish. Hairs of tail ochraceous yellow, ringed with black. Inside of the well developed ears ochraceous, outside whitish; behind the ears a whitish spot. The dark-brown eyes are surrounded by a whitish circle. Whiskers black.

Some specimens from Angola present a mode of coloration just intermediate between *Sciurus congicus* Kuhl and the ochraceous form described as *Sciurus flavivittis*.

	m. m.
Length of head and body	187
» » tail with tuft	175
» » » without tuft	160
» » hind foot	41.5
» » skull	37
Width between the jugalia	19.5
» » » orbits	9
Length upper molar series	7
Distance of incisor and first upper molar	7.5

There are five molars [1]) in each upper jaw: the first one

1) Prof. Peters called my attention to the fact, that there is in the Berlin Museum a skull of a *Sciurus congicus* which shows the molars more worn out than those in a skull of a *Sciurus flavivittis*, although the latter belongs to an older individual. He therefore believed that *Sciurus congicus* and *Sciurus flavivittis* are two distinct species. But in my opinion the more or less worn-out aspect of the molars *can be* a consequence of age, but it *need not always* have the same reason, as it can also be a mere local phenomenon, resulting for instance from the nature of the food.

is strongly developed. Incisors smooth, orange colored.

Hab. Congo (Tuckey); Quanza-river (British Museum); Angola (Monteiro), Novo Rodondo (Falkenstein); Mossamedes, Cirravel (Sala), Cunene-river (British Museum); Zambesia, Cabaceira (Kirk); Mossambique, Quitangonha, Mesuril, Mossimbōa (Peters); Zanzibar, Bogamoyo (Pères du Saint-Esprit), Mombaça (Kirk).

It is very common in mango-plantations and builds its nest in hollowed trees.

Mounted specimens in the Leyden Museum:

1. Adult male, Mossamedes, Cirravel, 13 July 1868, Sala. — 2. Adult male, Cirravel, 28 August 1868, Sala. 3. Skull of n°. 1.

C. Squirrels with several stripes on back and sides.

α. Fur soft.

Sciurus lemniscatus.

1857. *Sciurus lemniscatus* Le Conte. Proc. Acad. Philadelphia. p. 11.

1862. *Sciurus isabella* Gray. Proc. Zool. Soc. London. p. 180. pl. XXIV.

1873. *Sciurus sharpei* Gray. Ann. and Mag. of Nat. Hist. XII. p. 265.

1881. *Heliosciurus sharpei* Trouessart. Catalogue des Rongeurs viv. et foss. p. 84; *Funisciurus lemniscatus* Trouessart l. c. p. 84.

The soft hairs of the upper parts and the sides of head and body and the outside of legs mouse-colored at the base. Back ornated with four black stripes, the two middle ones are the longest and run from the nape of the neck to the root of the tail, both the other ones from the shoulders to the upper parts of the thighs. Head and outside of legs olivaceous rusty brown; line along the spine rather indistinct olivaceous brown; lines between the black stripes lighter colored; sides of the body mixed with greyish. Sometimes a more ochraceous tinge prevails. Tail olivaceous brown

with a black ring. Hairs of chin, throat, breast, belly and inside of legs pure white throughout.

A light spot behind the well developed ears. A whitish circle surrounds the eyes. Whiskers black.

	m. m.
Length of head and body	186
» » tail with tuft (incomplete)	about 180
» » » without tuft (incomplete)	» 140
» » hind foot	41
» » skull	42
Width between the jugalia (incomplete)	about 22
» » » orbits	10.5
Length upper molar series	7
Distance of incisor and first upper molar	10

There are five molars in each upper jaw; the first is a very well developed tooth. The smooth incisors are orange colored.

Hab. Cameroon mountains (Burton); Gaboon (Ansell, Verreaux, Laglaize); Ogobai-river (Marche); Chinxoxo (Falkenstein); Angola, Kuango (v. Mechow).

Captain Burton found this squirrel 7000 feet above the level of the sea in the Cameroon-mountains.

Mounted specimens in the Leyden Museum:

1 and 2. Adult females, Ogobai, Schlüter.

3 and 4. Skulls of nos. 1 and 2.

β. Fur harsher.

Sciurus getulus.

1560. *Sciurus getulus* C. Gessner. Icones animalium quadrupedum viviparum et oviparum. First edition.

1788. *Sciurus getulus* Lin. Systema naturae. T. I. p. 150.

1842. *Xerus trivittatus* Gray. Ann. and Mag. of Nat. Hist. X. p. 264.

Sciurus (*Xeros*) *praetextus* Wagner Schreber's Säugethiere. Supplem. Bd. III. p. 216.

1853. *Xerus getulus* Temminck. Esquisses Zool. sur la Côte de Guiné. 1e partie. p. 124. Note.

1867. *Macroxus getulus* Gray. Ann. and Mag. of Nat. Hist. XX. p. 331; *Xerus trivittatus* Gray. l. c. p. 334; *Xerus setosus* Gray. l. c. p. 333 (partim). *Funambulus getulus* Fitzinger. Sitzb. d. K. Akad. d. Wissensch. I. p. 33; *Xerus trivittatus* Fitzinger. l. c. p. 36; *Xerus praetextus* Fitzinger. l. c. p. 36. — *Xerus trivittatus* Gray = *Sciurus getulus* Linnaeus. Sclater. Proc. Zool. Soc. London. p. 817. Note.

1881. *Spermosciurus congicus* Trouessart. Catalogue des Rongeurs viv. et foss. p. 84 (partim); *Spermosciurus getulus* Trouessart l. c. p. 85.

Fur short, flattened and harsher to the touch than in the other species of this genus. The ears very small. Upper incisors grooved.

Upper parts and sides of head, back and outside of legs, except the feet, black, ringed with brownish yellow. A stripe running on each side of the back from above the shoulder to the upper parts of the thigh, chin, throat and feet white throughout. On the middle of the back along the spine is an indistinct pale colored stripe. Sides of the body, belly and inside of legs mouse-colored, largely tipped with white. Sometimes the stripe along the spine, the hind parts of the body and outside of legs of a more reddish brown color. Root of tail above same color as back. Hairs of tail dirty white with one or two black rings.

Whiskers black. Eyes surrounded by a whitish circle. The earconch scarcely perceptible.

	m. m.
Length of head and body	256
» » tail with tuft (very incomplete) . . .	140
» » hind foot	50
» » skull (incomplete) . . . . . about	48
Width between the jugalia (incomplete) . . »	31
» » » orbits (incomplete) . . »	15
Length of upper molar series	10
Distance between incisor and first upper molar .	10.25

There are five upper molars in each jaw: the fifth is a strongly developed tooth. Upper incisors distinctly grooved, light orange colored.

Hab. Marocco, Mogador (Delaporte), prov. Haha (Drummond-Hay).

Nothing is known about the habits of this species.

Mounted specimens in the Leyden Museum:

1. Adult female, Marocco, died in the Royal Zoological garden at Amsterdam. — 2. Half grown individual, Mogador, Delaporte, 1837, exchanged with the Paris Museum, 1868.

3. Skull of n°. 2.

As it externally resembles the species of the genus *Xerus*, it has been regarded as belonging to this genus by the majority of naturalists. But a closer examination shows that although the ears are very short compared with these organs in the other true *Sciuri* and the hairs generally rather rigid and flattened, the latter nevertheless show a great difference in structure with the hairs of the true *Ground squirrels*, viz: they are not nearly so fragile, and not channelled. Moreover the claws are curved as in true *Sciuri* and not so straight; this is indicative of a climbing and not of a burrowing habit.

It still is a very rare species in the collections, two specimens being contained in the Leyden, two in the Paris, four in the British, two in the Berlin and a single individual, *Xeros praetextus* Wagner in the Munich Museum. When better known, it may perhaps prove to belong to a genus between *Sciurus* and *Xerus*, but for the moment it is most appropriately placed at the end of the genus *Sciurus*.

C. Gessner was the first to describe this species under the name *Sciurus getulus*. I did not see the first edition of his book, but consulted the third edition; on page 112 a rather good figure and a very clear description are to be found. The specific title *getulus* is derived from Getulia, the ancient name of Barbaria, the locality where this species was found. I believe that *Mustela africana* Clusius and *Mustela lybica* Nieremberg also belong to the above named species.

Xerus.

The harshness of the fur, the shortness of the ears, the long claws and the elongated middle toe characterise this genus. Palate extending a rather considerable distance behind the molars. Jugalia depressed. The hairs are short and very sparingly spread, especially on the under parts of the body: they are attenuated at both ends, acutely pointed and flattened. Each hair is provided with a longitudinal channel or groove, and so the hairs are not circular in a transverse section; they are very rigid and but little flexible. The hairs of the depressed tail are always less rigid.

The ear is less developed than in any other Squirrel and is either quite absent or is shaped nearly as the human earconch.

The middle toe of fore and hind legs is longer than the other toes. All the claws are more developed than in other Squirrels and are nearly straight.

The characters cited clearly indicate a peculiar manner of living and indeed the species of this group have without exception burrowing habits; contrary to the species of the genus *Sciurus* which are *Tree-Squirrels*, they are *Ground-Squirrels*.

The several authors and compilers have described or cited a large number of species as belonging to this genus, for instance: Wagner six, Temminck six, Giebel five, Fitzinger eleven, Gray three with one variety, Huet eight and Trouessart nine species. — After a very careful examination and after having seen nearly all the specimens of this group contained in the different Musea, I cannot distinguish more than three well defined species. One of these, *Xerus capensis*, is only found in South Africa, the two others *Xerus erythopus* and *Xerus rutilus* inhabit both East and West Africa and apparently do not occur in those districts, where the South African species is living.

According to the presence or absence of the external ear and to the form of the skull I distinguish the following groups:

A. Ear-conch developed. Skull elongate and small.
B. No ear-conch. Skull short and broad.

A. Ear-conch developed. Skull elongate and small.

Xerus rutilus.

1826. *Sciurus rutilus* Cretzschmar. Atlas zu der Reise im nördl. Afrika. Erste Abth. Zoologie. p. 59, Taf. 24.

1828. *Sciurus brachyotus* Hemprich und Ehrenberg. Symbolae physicae. Déc. I. Taf. 9.

1836. *Sciurus* (*Spermosciurus*) *simplex* Lesson. Histoire Nat. des Mammif. T. V. p. 402.

1843. *Xerus rutilans* Gray. List of the specimens of Mammalia in the coll. of the British Museum. p. 144.

1861. *Xerus dabagála* v. Heuglin. Petermann's Mittheilungen. p. 17. — Nova acta Ac. Caes. Leop. p. 4. pl. II. fig. 3.

1867. *Xerus flavus* Alph. Milne Edwards (non Linné). Revue et Magazine de Zoologie. p 229.

1880. *Xerus fuscus* Huet. Nouvelles Archives du Muséum. Deuxième Serie. p. 139. pl. VI. fig. 1. — *Xerus flavus* Alph. Milne Edwards (non Linn.). l. c. p. 140. pl. VI. fig. 2.

Hairs of the upper parts and sides of the body, outside of the legs and fore and hind feet uniformly colored. Each hair is straw-colored with a white tip; the side of the hairs turned towards the body is white and glossy. The under parts of the body and inside of legs are pure white. The hairs of the tail have the same color as those of the upper parts of the body, but here each hair is embellished with four pure white rings and a tip of the same color, this white tip growing longer towards the apex of the tail. Out and inside of the ears with very short hairs. A pure white circle surrounds the brown eyes. Whiskers black.

It seems however that this mode of coloration is not constant, in some individuals the straw-color partly being replaced by a more fleshy tinge, whereas in other ones a blackish brown predominates. The straw-color is peculiar to the type of this species, viz: to some specimens collected by Rüppell in Abyssinia. The more fleshy tinge has induced v. Heuglin to describe a new species *Xerus dabagála* from the Somali-Coast and also Prof. Alph. Milne Edwards to create his *Xerus flavus*; the type specimens of the latter species were from the Gaboon, but lately the Paris Museum has recieved specimens from the Somali-Coast which altogether show the same coloration. Under the name *Xerus fuscus*, Huet described specimens from Abyssinia; the upper parts of these individuals present the above named blackish brown color.

	m.m.
Length of head and body	244
» » tail with hairs	260
» » tail without hairs	196
» » hind foot with claw	55
» » skull	51
Width between the jugalia (incomplete)	about 32
» » » orbits	15
Length of upper molar series	10
Distance between incisor and first upper molar	11.5

There are four molars in each jaw. Incisors light orange, smooth.

N. i. Schillu (Rüppell), Dabagála (v. Heuglin).

Hab. Senegal (Lesson)?; Gaboon (Guislain). — White Nile (d'Arnaud), Abyssinia (Rüppell), Mount^s of Adel (Schoeffer, Bocourt), Bogos, Keren, Massaua (v. Heuglin), Somali-coast (Révoil), Zeila and Berbera (v. Heuglin).

Rüppell and v. Heuglin relate that *Xerus rutilus* lives in holes, which it digs very quickly. Sometimes it frequents trees and shrubs, but if detected it rapidly disappears in its underground habitation; here also parturition takes place. It lives in pairs. In the morning and in the evening it leaves the

hole in search of buds, leaves, seeds and fruits on which it feeds. v. Heuglin has captured it in sandy plains on the Somali-coast and Blanford has observed this species in rocky places close to the shore of the Annesley-Bay and saw it also at an elevation of 1500 feet. Frequently five or six are seen together keeping to the ground.

Mounted specimens in the Leyden Museum:

1. Adult male, Abyssinia, Voyage of Rüppell. — 2 and 3. Adult females, Rüppell, Abyssinia. — 4. Adult male, Frank, 1880, Abyssinia. — 5. Adult, Somali-coast, Révoil 1881, presented by Prof. Alph. Milne Edwards.

6. Skull of N°. 1. — 7. Skull of N°. 2. — 8. Skull of N°. 3. — 9. Skull of N°. 4. — 10. Skull of N°. 5.

Xerus erythopus.

1803. *Sciurus erythopus* Et. Geoffroy Saint Hilaire. Catalogue des Mammifères du Muséum national d'Histoire naturelle. p. 178. (A very rare book).

1817. *Sciurus albovittatus* Desmarest. Nouveau dict. d'Hist. Nat. T. X. p. 110.

1830. *Sciurus erythropus* Fr. Cuvier. Mammif. lithogr. T. IV.

1835—40. *Sciurus leucoumbrinus* Rüppell. Neue Wirbelthiere zu der Fauna von Abyssinien gehörig. p. 38.

1836. *Sciurus (Spermosciurus) congicus* (?) Lesson. Histoire naturelle des Mammif. T. V. p 401 — *Sciurus (Spermosciurus) marabutus* and *prestigiator* Lesson. l. c. p. 402. — *Sciurus (Spermosciurus) pyrropus* Lesson (non Fr. Cuvier). l. c. p. 400.

1843. *Sciurus pyrrhopus* Wagner (non Fr. Cuv.). Schreber's Säugethiere. Suppl. Bd. III. p. 215. — *Sciurus erythropus* Wagner. l. c. p. 215. — *Sciurus congicus* (?) Wagner. l. c. p. 217.

1845. *Sciurus erythropus* Schinz. Synopsis Mammalium. Bd. II. pp. 23 (partim) and 27. — *Sciurus leu-*

cumbrinus Schinz. l. c. p. 27 (partim). — *Sciurus setosus* Schinz. l. c. p. 27 (partim).

1853. *Xerus congicus* Temminck (non Kuhl). Esquisses zoologiques. T. I. p. 125. — *Xerus erythropus* or *lucoumbrinus* Temminck. l. c. p. 124.

1867. *Xerus setosus* Gray. Ann. and Mag. of Nat. Hist. III Series. XX. p. 333 (partim).

1867. *Xerus lessonii* Fitzinger. Sitzb. d. K. Akad. d. Wissensch. I Abth. p. 36.

1880. *Xerus congicus* Huet (non Kuhl). Nouvelles Archives du Muséum d'Hist. nat. Deuxième Série. p. 135 (partim).

1881. *Geosciurus erythropus* Trouessart. Catalogue des Rongeurs vivants et fossiles. p. 28.

This species in many points resembles the foregoing, except the pure white streak along each side from the shoulder to the upper part of the thigh, of which streak there is not a trace in *Xerus rutilus*: a closer inspection however furnishes the following remarks: the general color is the same as in *Xerus rutilus*, we even find here the three tinges above noticed, viz: straw-color, a more fleshy tinge and blackish-brown; the first mode of coloration being peculiar to the type-specimens of this species, the third to *Xerus congicus* Temminck (non Kuhl), whereas I observed the second color in a specimen from Sudan, collected by v. Heuglin and now in the Stuttgart-collection, and also in an individual in the Darmstadt Museum and in another in the Mainz Museum.

In all specimens there is a more or less important number of wholly blackish brown hairs irregularly planted among the other hairs. The hairs on the back are somewhat longer than in *Xerus rutilus* and although channelled the grooves are not so clear and the hairs less rigid. Each hair has a yellowish brown tip and the side of the hair turned towards the body has the point similarly colored and is for the rest glossy white The hairs of the tail present the following coloration: each hair is reddish brown at its

base, further ringed with black and white, the tip always being white.

The hairs of the side-streaks are white throughout, only a few being brown tipped.

A white circle surrounds the black eyes. Whiskers black. Ears a little more developed than in *Xerus rutilus*, but this may perhaps be merely a relative difference, because *Xerus erythopus* is in all its proportions a stronger animal and of a considerably larger size.

	m. m.
Length of head and body	297
» » tail with hairs	300
» » » without hairs	230
» » hind foot	73
» » skull	62
Width between the jugalia (incomplete) . . about	34
» » » orbits	16
Length of upper molar series	12.5
Distance between incisor and first upper molar	13.5

There are five molars in each upper and four in each lower jaw: here the fifth molar, as usual when this tooth is developed, is very small. Incisors smooth, light orange or yellowish. It seems that exceptionally fullgrown individuals have pure white incisors, for instance this is the case in two specimens in the Museum at Prague. A skull in our collection (vide infra N°. 21) has the lower incisors and an upper one pure white, the other upper incisor being yellowish. In young individuals the small foremost upper molar is absent and the incisors always have a white or yellowish white color. I observed this in all the young specimens from Senegal, Liberia, Gold-coast and Bogos in the Leyden Museum, from Kitui and Chinxoxo in the Berlin collection, from an unknown locality in the Munich Museum and also in two specimens from Bogos in the Stuttgart collection.

N. i. Schillu (Rüppell) and Sabera (Rüppell).

Hab. Senegal; Sierra Leone; Liberia (Büttikofer and Sala);

Gold-coast (Pel), Ashantee (Verreaux), Yoruba (Mann), Aburi (Reichenow); Loango, Chinxoxo (Dr. Falkenstein); Burnu (Fr. Cuvier), Sudan (v. Heuglin); Egypt (Clot-Bey), Nubia, Keren, Bogos, Sennar, Kordofan (Rüppell, v. Heuglin and Dr. Prunner); Abyssinia (Rüppell, v. Heuglin, Blanford); Zanzibar, Kitui (Hildebrandt).

Temminck (fide Pel) reports that this species is very common on the Gold-coast there where the woods border upon the cultivated grounds. It feeds on millet and other grains, is very shy and by day it hides away in holes at the base of trees or in shrubs. Von Heuglin says that it has the same manner of living as *Xerus rutilus*. Blanford found this species in rocky places about Senafé and elsewhere, in Tigré up to about 9000 feet and as low as 4500 feet in the Anseba valley. It has six mammae. On the second of March near Takonda he shot a gravid female containing four well developed young ones: two, a male and female in each horn of the uterus. Büttikofer relates that they are very numerous in groundnut plantations and also in newly planted cassave-farms: they dig out the young cassave-plants, the bark of which they gnaw off. They burrow holes in the ground in which they sleep at night. They feed at each hour of the day, even during the hot meridian sun. They are very attentive and shy, and more easy to observe than to shoot, as they mostly make their escape in the neighboring shrubs, where nobody can find them. In captivity they soon grow very tame.

Rüppell relates that his specimens from Abyssinia were darker colored than the Kordofan-individuals and Blanford states that the specimens from Western Africa are of the same size of the Abyssinian species, but much darker in color.

Étienne Geoffroy Saint Hilaire was the first to describe this species. He only disposed of a single individual from an unknown locality. As his description is very clear and the book in which he described this species seems to be exceedingly rare (cf. Catalogue méthodique de M. Is. Geoffroy

Saint Hilaire, 1851, p. V de l'introduction) and unknown to several naturalists, I transcribe here what I find on page 178 of the *Catalogue des Mammifères du Museum national d'Histoire naturelle de Paris*, 1803: »10 Esp. l'Écu»reuil fossoyeur. *Sciurus erythopus* (Geoff.). Caract. Roux, »blanc-jaunâtre en dessous; une ligne blanche sur les flancs; »queue ronde et à poils courts à sa base. Espèce inédite. »Descript. T. 0,24 m. (10 p.). Dessus de la tête et du corps »d'un roux teint de brun, les poils étant annelés de ces »deux couleurs; une ligne d'un blanc-jaunâtre sur les flancs, »pates et dessous du corps d'un blanc sale tirant sur le »jaune; cuisses d'un fauve assez vif; queue plus longue que »le corps, ronde et à poils courts à sa base seulement, à »longs poils gris, et brun dans le reste de sa longueur. »Patrie inconnue, N°. CCCLXVI. Cet individu provenant »des collections de Hollande est remarquable par la lon»gueur extraordinaire de ses ongles et la brièveté singulière »de ses oreilles." — This typical individual is not to be found in the Museum of the Jardin des Plantes, but in its stead there is now another specimen labelled 1820. The specimens in the named Museum labelled *leucoumbrinus* are the type-specimens of *albovittatus* Desmarest, as M. Huet personally told me.

Mounted specimens in the Leyden Museum:

1. Very young male, Senegal, 1823. — 2. Young male, Buluma, Fisherman-lake, Liberia, 4 February 1881, Büttikofer and Sala. — Young male, Buluma, 24 January 1881, Büttikofer and Sala. — 4 and 5. Young males (in spirits) Buluma, 4 February 1881, Büttikofer and Sala. — 6. Adult male, Saccondé, Gold-coast, March 1352, Pel. — 7. Adult male, Rio-Boutry, 1842, Pel. — 8. Not fullgrown female, Gold-coast, Pel. — 9 and 10. Young individuals, Gold-coast, 1842, Pel. — 11. Adult male, Egypte, presented by M. Clot-Bey. — 11. Adult female, Egypte. — 13. Male, Sennar, 1868, from the Paris-Museum. — 14. Young female, Bogos, v. Heuglin, December 1863. — 15. Adult male, Abyssinia. — 16. Nearly fullgrown specimen, Abyssinia, Frank, 1880.

17. Skeleton of an adult individual that formerly lived in Schönbrunn, presented by M. v. Pelzeln, 1881.

18. Skull of N°. 6. — 19. Skull of N°. 10. — 20. Skull of N°. 13. — 21. Skull of N°. 15. — 22. Skull of N°. 16.

B. No ear-conch. Skull short and broad.

Xerus capensis.

1792. *Sciurus capensis* Kerr. The animal kingdom or Zoological System of the celebrated Sir Charles Linnaeus. p. 266. (A very rare book).

1793. *Sciurus namaquensis* Lichtenstein. Catalogus rerum naturalium rarissimarum. Hamburg. p. 2. n°. 16.

1811. *Sciurus capensis* Thunberg. Mémoires de l'Acad. de St. Pétersb. T. III. p 309. n°. 29.

1820. *Sciurus levaillantii* Kuhl. Beiträge zur Zoologie. p. 67.

1829. *Sciurus ocularis* Smith. Zool. Journ. IV. p. 439. *Siurus albovittatus*, var. δ. *erythopus* Fischer. Synopsis mammalium. p. 360 (partim).

1832. *Sciurus setosus* Smuts. Enumeratio mammalium capensium. p. 33 (partim).

1843. *Sciurus leucoumbrinus* Wagner. Schreber's Säugethiere. Supplem. Bd. III. p. 213 (partim). *Sciurus setosus* Wagner. l. c. p. 214. (partim).

1845. *Sciurus erythropus* Schinz. Synopsis mammalium. Bd. II. p. 23 (partim); *Sciurus leucumbrinus* Schinz. l. c. p. 27 (partim); *Sciurus setosus* Schinz. l. c. p. 27 (partim).

1867. *Xerus* (*Geosciurus*) *setosus* Gray. Ann. and Mag. of Nat. Hist. III Series. XX. p. 333 (partim).

1880. *Xerus capensis* Huet. Nouvelles Archives du Museum. Deuxième Série p. 133.

1881. *Geosciurus setosus* Trouessart. Catalogue des Rongeurs vivants et fossiles. p. 28.

Agrees with *Xerus erythopus* in having a pure white streak along each side from the shoulder to the upper parts of the thighs and with *Xerus rutilus* by the shortness and nature of the hairs of the upper parts of head and body: the hairs of the named parts are straw-colored with white tips, a few wholly blackish brown ones are interspersed. In the Stuttgart collection I saw an individual from the Cape colored like *Xerus dabagála* v. Heugl., viz: with a fleshy tinge. The entire absence of an earconch distinguishes this species not only from the other *Xerus*-species but also from all the other *Sciuri* hitherto discovered, so that this alone at once suffices to characterize this form.

The black eyes are surrounded by a white circle. Whiskers black.

	m. m.
Length of head and body.	318
» » tail with hairs (incomplete). . . about	260
» » » without hairs (incomplete). . »	225
» » hind foot.	68
» » skull	59
Width between the jugalia	38.5
» » » orbits	17.5
Length of upper molar series	12
Distance between incisor and first upper molar .	13

In each jaw there are never more than four molars. Incisors without exception always pure white and without groove.

It is not without reason that the form of the skull has attracted the attention of different naturalists. In 1835 Rüppell observed that there is a difference in the form of the skull between *Sciurus setosus* and *leucoumbrinus* and Sundevall wrote (Om Professor I. Hedenborgs insamlingar of Däggdjur i Nordöstra Africa och Arabien. 1842) „Maxime memorabilis est „similitudo externa et dissimilitudo craniorum *Sciuri leu-*„*coumbrini* et *setosi*, qui, secundum externa, varietates „unius speciei, secundum crania diversi genera haberi pos-

„sent. Cranium *Sc. leucoumbrini* ♂ adult., longit. 58 mill., „lat. in arc. zyg. 31; sat angustum, arcu zyg. in hoc „genere singulari, angusto, parum curvato; rostro conico, „subacuto. *Sc. setosus*, ♀ ex Afr. merid. Cranium long. 59 „mill., lat. in arc. zyg. 38 (fere 1¼ praec.s); latum, arcu „zyg. lato, curvato-patente, rostro brevi, obtuso, lineari; „forma ossium nasi et cet. longe a prioris diversa. . . ." That Sundevall's observation is very exact must be acknowledged by every one who takes the trouble of using his eyes and it is indeed very curious and incomprehensible how Gray (Ann. and Mag. of Nat. Hist. 1867 p. 333) could object to it and finish his very insignificant opposition with the following statement; „the two species may be „distinct; but I am inclined to regard the characters gi„ven (by Sundevall) as only individual peculiarities, though „my idea may prove incorrect when a large series from „each country can be compared; skulls, however, are as „apt to vary as other parts of the animal, and are only „to be depended on when a series can be examined and „compared." — If skulls and other parts of animals of the same species did vary as a rule in such a remarkable degree as in the case in question, how would it then ever be possible to distinguish any two species from each other? But happily and nothwithstanding Gray's sentence nearly always and especially in this case the skulls of the different species of mammals show more or less important differences, which facilitate their distinction. I need not enter into a detailed discussion, and I will suffice to remark that the nasalia of *Xerus capensis* are much broader in front and the jugalia much broader and stouter than in any other African Squirrel. Moreover on comparison of the measures given above of the skull of *Xerus capensis* with those of *Xerus erythopus* and *rutilus* one must wonder that Gray being acquainted with the observation of Sundevall, has not taken advantage of this beautiful opportunity to create a new genus for the Cape species.

It seems that up to this day it has remained a fact

unknown to the majority of naturalists, that Kerr was the first to describe this species under the name *capensis*. Some authors give it the specific title *capensis* Thunberg, but Thunberg wrote in 1811 and nineteen years earlier Robert Kerr (1792) characterised it in the following excellent terms: „Cape Squirrel. *Sciurus capensis*. Of „a pale ferruginous colour on the upper parts of the „body, mixed with black; with a white line from the „shoulder along each side: the tail is black in the middle „and hoary at the sides; the ears are scarcely apparent. „(Earless Dormouse. Penn. hist. of quadr. n°. 290). — The „head is flat, with a blunt nose, full black eyes, divided „upper lip and long whiskers, the belly and feet are dirty „white, and there is a white line above each eye: the toes „are long and distinct, with a large knob on each fore „foot in place of a thumb: the claws are long; the hind „legs are black and naked behind. It is „about the size of the Common Squirrel but much broader „and flatter in its make."

The name *setosus* Forster would have been the oldest, if Forster had indeed described this squirrel anywhere; in vain however I have carefully scrutinized periodical works, catalogues, etc., and neither I nor one of my friends, who kindly investigated this question at my request, have been able to find a description of the Cape Squirrel by Forster. Lichtenstein in 1844 published: „Forsteri descriptiones Animalium in itinere ad Maris australis terras per annos 1772—74 suscepto observatorum," and there we read on page 39: „*Sciurus* „*palmarum* Linn. Var. β = *Sciurus albovittatus* Desm. = *Sciu-* „*rus setosus* Smuts. = *Sciurus capensis* Thunb... Habitat „ad Cap. bon. spei..." If Forster had named this Squirrrel *setosus*, Lichtenstein would not have cited *setosus* Smuts, this author having written in 1832. Fischer (1829) was the first author, as far as I know, who cited *setosus* Forster and all the succeeding writers have merely copied this name without giving any account as to where it had properly been described by Forster.

N. i. Aguimp. Thunberg and Smuts.

Hab. Namaqua-land (Thunberg and Lichtenstein), Masilikats-land, Lattaku (Verreaux), Griqua-land (Staib) and southwards the whole Cape-colony (v. Horstock, v. Ludwig, Krebs, Smith, etc.)

Kerr tells us that it lives near the Mountains of Sneeberg, 800 miles north from the Cape of Good Hope. It never climbs trees, but burrows in the ground, forming a warm nest, with a round hole, in which it lodges, closing up the orifice. It feeds on bulbous roots, especially potatoes; it is very tame and never offers to bite, walks often on its hind feet, frequently lies on its belly, and often flirts up the tail. Thunberg very pithily describes the harshness of the hairs: „pili caudae longi, molles; „corporis vero duriores, sic ut, dum baculo castigatur, „sonus edatur fere ut in Hystrice."

Mounted specimens in the Leyden Museum:

1. Adult female, Cape of Good Hope. — 2. Half grown female, Cape of Good Hope, v. Horstock.

3. Skull of N°. 1. — 4. Skull of N°. 2.

Recapitulation.

Sciurus.

	Mounted skins.	Spirits. Skel.	Skulls.
Sciurus stangeri. — West Africa (Liberia Ogobai-river)	11		7
„ ebii. — West Africa (Gold-coast — Ovenga-river)	2		2
„ aubinnii. — West Africa (Liberia — Gold-coast)	6		3
„ rufo-brachiatus. — West Africa (Liberia — Angola)	18		6
„ palliatus. — East Africa (Galla-land — Natal).			
„ mutabilis. — East Africa (Boror — Zambesi valley).			
	37		18

		Mounted skins.	Spirits.	Skel.	Skulls.
	Transport . .	37			18
Sciurus	shirensis. — East Africa (Shire-river).				
„	punctatus. — West Africa (Banana-islands — Chinxoxo) . .	10	2		5
„	annulatus. — West Africa (Gambia-river — Quanza-river); East Africa (Tigre — Sennar). . .	10			3
„	cepapi. — East Africa (Dana-river — Cape).	3			2
„	poensis. — West Africa (Liberia — Gaboon)	12			2
„	minutus. — West Africa (2 degrees north — 2 degrees south of the Equator)				
„	pyrropus. — West Africa (Casamanza-river — Angola) . . .	15	3		4
„	congicus. — West Africa (Congo-river) — Cunene-river); East Africa (Bogamoyo — Cabaceira).	2			1
„	lemniscatus. — West Africa (Cameroon-mountains — Angola) .	2			2
„	getulus. North West Africa (Marocco)	2			1
	Xerus.				
Xerus	rutilus. — West Africa (Senegal-Gaboon); East Africa (Massaua-Somali-coast)	5			5
„	erythopus. — West Africa (Senegal-Chinxoxo); East Africa (Egypt-Zanzibar)	14	2	1	5
„	capensis. — South Africa . .	2			2
		114	7	1	50